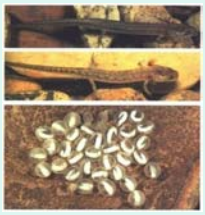
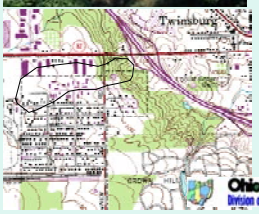
Primary Headwater Stream Initiative



- Paul Anderson-NEDO
- Mike Bolton-CO
- Robert Davic-NEDO
- Chris Skalski-CO
- Bill Schumacher-CO
- Steve Tuckerman-NEDO

The Basics - What is an Ohio EPA Primary Headwater Stream?

- A surface watercourse with a defined **Bed** and **Bank**
- Either continuous or periodical **flowing water** (e.g.—ephemeral, intermittent, interstitial, perennial)
- A watershed generally **less than one square mile** and **deepest pools < 40cm**



GENERAL TEMPLATE FOR STRATIFYING RESOURCE TYPES

- **Lotic Systems**
  - < 20.0 sq. mi.
    - Headwater Streams
      - Primary Headwater Streams
  - < 1.0 sq. mi.
    - Wadeable Streams
    - Large Rivers
    - Great Rivers
  - Wetlands
- **Lentic Systems**
  - Glacial Lakes
  - Reservoirs
  - Great Lakes
- **Marine Systems**
  - Near Coastal
  - Estuary
  - Coral Reef

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Current Ohio EPA biotic assessment tools (IBI, ICI, QHEI) are often inappropriate at the Primary Headwater Stream scale (< 1.0 sq. mi)

IBI = Fish Index of Biotic Integrity

ICI = Invertebrate Community Index

QHEI = Qualitative Habitat Evaluation Index

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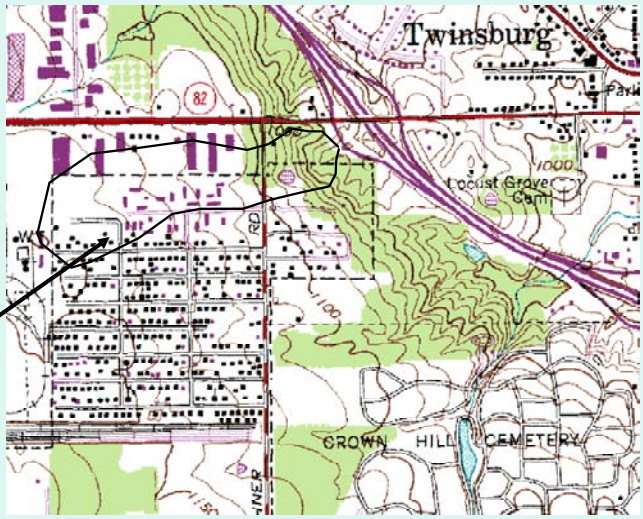
Desktop PHWH-Stream Identification

- **USGS 1: 24,000 Topographic Mapping Scale**



0.68 sq. mi.

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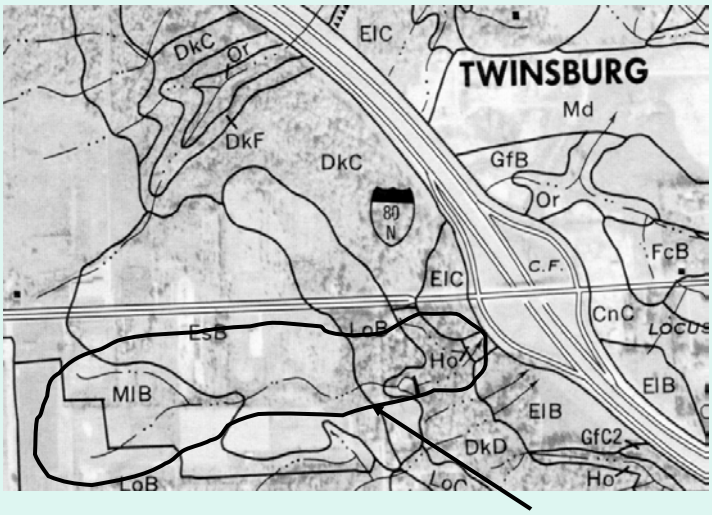
Desktop PHWH-Stream Identification



NRCS Soil Map including hydro-layer

Scale Range = 1:15,000 to 1:20,000

Watershed from previous USGS slide

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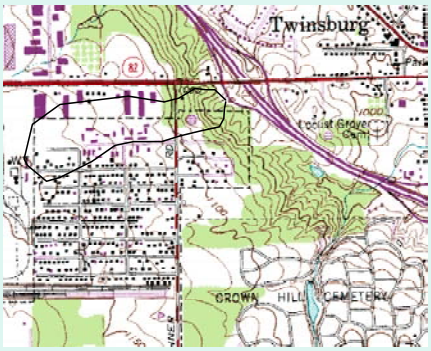
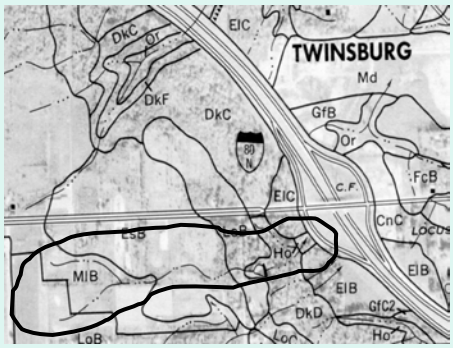
For Accurate Mapping of Primary Headwater Streams: Do Not Use U.S.G.S. Topographic Scale





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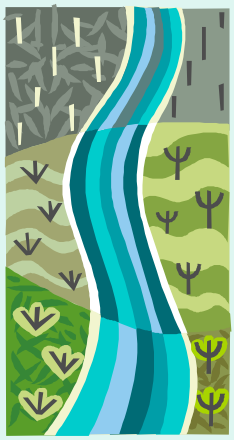
Headwater Stream Benefits

- Reduces flooding & channel scour (energy)
- Processes nutrients & sediment
- Protect downstream ecology & water quality
- Protects drinking waters supplies



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Headwater Stream Benefits

- Direct benefits include providing a habitat for unique species found only in the upper reaches of watersheds
- The stream in your backyard

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What are the consequences of not recognizing headwater streams?

Local and downstream impacts are “clear”

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Watershed level impacts over time -

Death by a 1000 thousand cuts

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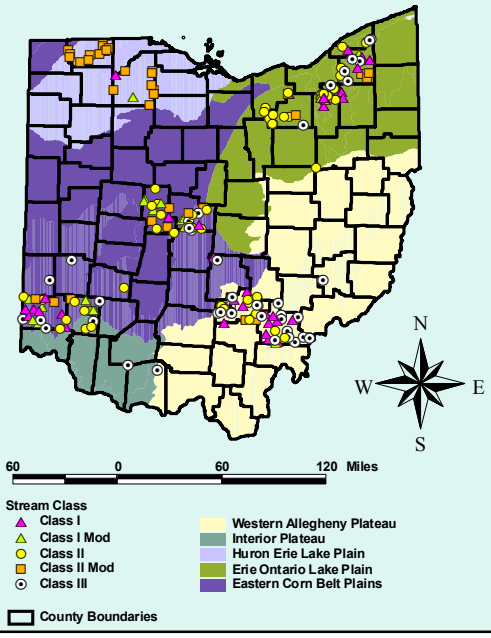
Figure 2. Ohio EPA PHWH Survey Sites 1999-2000



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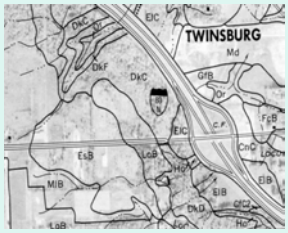
Study Design: Field Evaluation

- **Biology:**
  - Fish
    Macroinvertebrates
    Amphibians
- **Water Quality:**
  - Field measures
    (DO,pH,Temp.,Conductivity)
- **Physical and Habitat Features:**

  (200 ft) zone



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THREE CLASSES OF PHWH-STREAMS IN OHIO

CLASS I-PHWH Stream

Ephemeral flow

Poor biotic diversity.

CLASS II-PHWH Stream

Permanent to intermittent flow.

Fair-good biotic diversity.

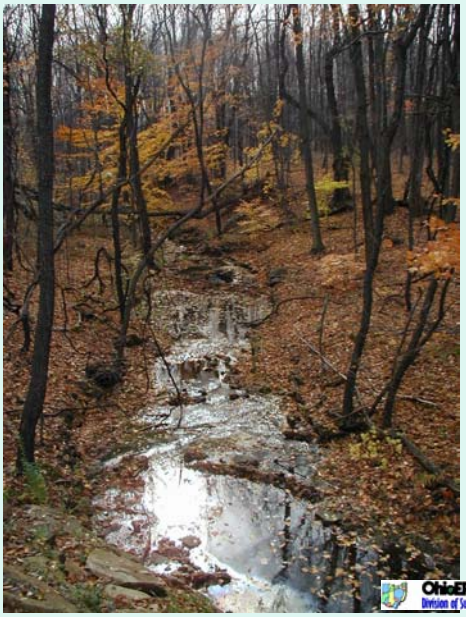
Warm water in summer.

CLASS III-PHWH Stream

Permanent (interstitial) flow.

Good-excellent biotic diversity.

Cold to cool water in summer.



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Salamanders Found in Primary Headwater Streams in Ohio

Class III Streams (Gilled larvae present on annual basis)

- Plethodontidae (Lungless)
- Subfamily Plethodontinae:
  - *Gyrinophilus* (2 species)
  - *Pseudotriton* (2 species)
  - *Eurycea* (3 species)

Class II Streams (Gilled larvae present seasonally)

- Ambystomatidae (Mole)
  - *Ambystoma* spp.
- Plethodontidae (Lungless)
- Subfamily Desmognathinae:
  - *Desmognathus* (2 species)

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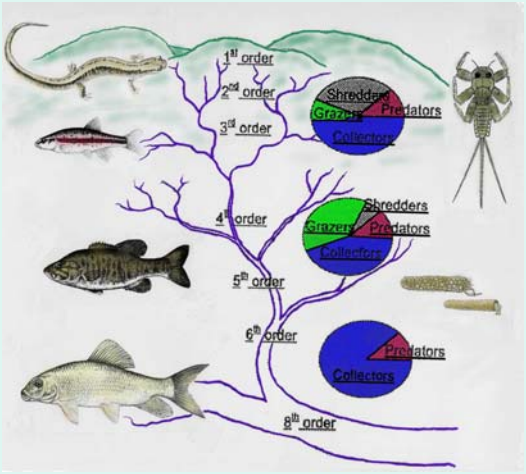
River Continuum Concept

- **Salamanders replace fish as the top vertebrate predator in primary headwater streams.**
- **Shredder functional group of benthic invertebrates is most common in primary headwater streams.**



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Class III-PHWH Stream Vertebrate Indicator Species

Redside dace

Mottled sculpin

Brook stickleback

- **Class III PHWH streams are characterized by the presence of cool to cold water adapted species of fish and salamanders.**

Two-lined Salamander

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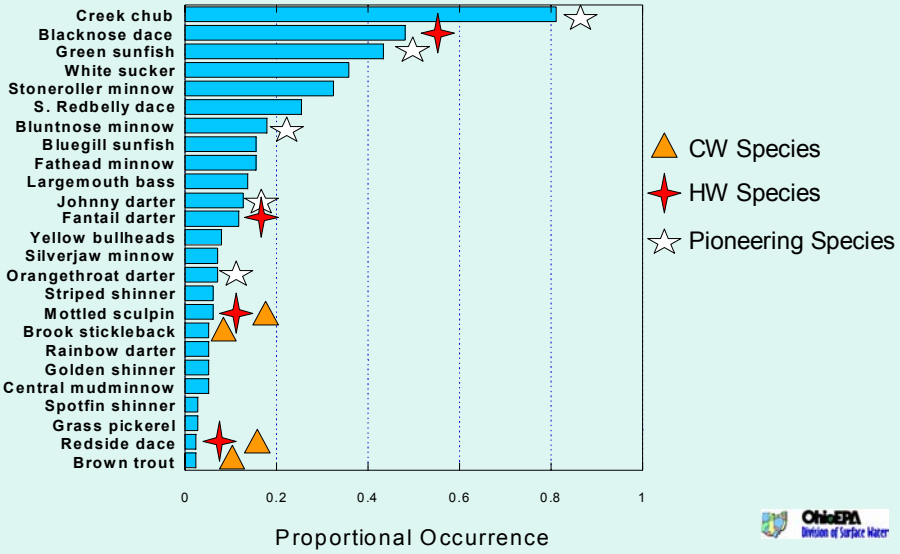
25 Most Common Fish Species in Primary Headwater Streams (< 1 sq. mi) from Ohio EPA Electrofishing Surveys (N=212 Sample Events from 144 Streams)



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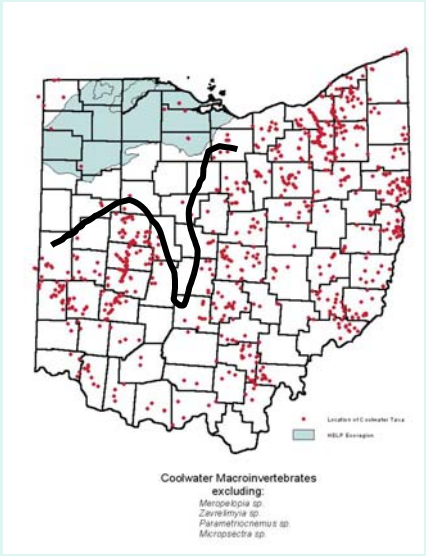
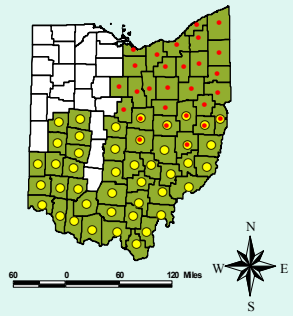
Distribution of Cold Water Benthic Macroinvertebrate Species in Ohio



Two-Lined Salamanders



Eurycea bislineata
Eurycea cirrigera

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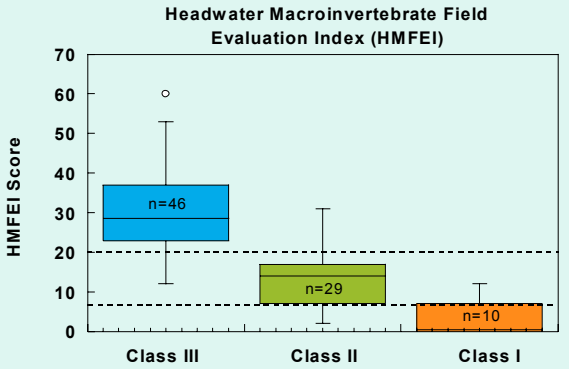
Headwater Macroinvertebrate Field Evaluation Index (HMFEI)

- **Rapid field assessment methodology based upon Family or Order level of taxonomy.**
- **Scoring based upon correlation to cool water habitats and number of EPT taxa present.**



Index developed by Mike Bolton, Ohio EPA Biologist

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Physical Habitat Can be Used To Predict PHWH-Stream Class

Initial Data Set	Qualitative Screening	Discriminant Analysis	Sensitivity Analysis: Final Metrics
Stream Order	Stream Order	Stream Order	
Flow Regime	Flow Regime	Flow Regime	
In-Stream Cover	In-Stream Cover		
Substrate	Substrate	Substrate	Substrate
Development			
Pool Depth	Pool Depth	Pool Depth	Pool Depth
Riffle Depth			
Riparian Width	Riparian Width		
Riparian Land Use	Riparian Land Use		
Gradient	Gradient		
Watershed Area	Watershed Area		
Sinuosity	Sinuosity	Sinuosity	
Bankfull Width	Bankfull Width	Bankfull Width	Bankfull Width
Bank Erosion			
Embeddedness			
Cover Types	Cover Types		
Water Chemistry			

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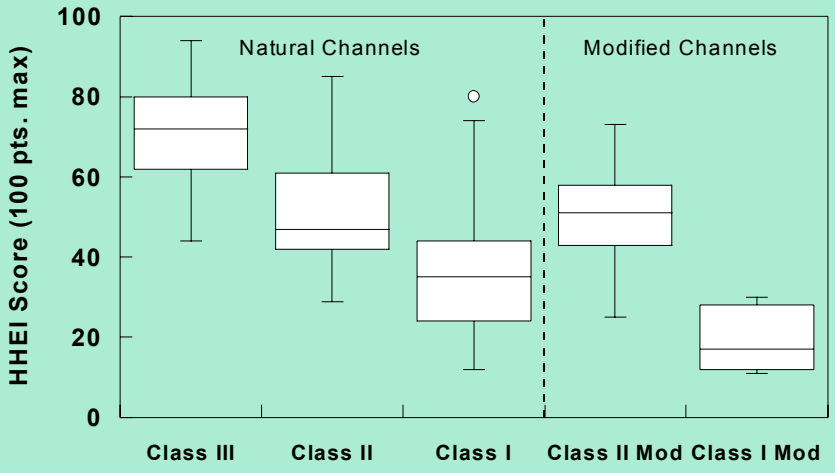
Ohio EPA Headwater Habitat Evaluation Index (HHEI)

Three Habitat Parameters Can Predict Biology !



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OHIO SPECIFIC TEMPLATE FOR STRATIFICATION

Warmwater Lotic Systems

Primary HW Streams (<1 mi²)	Headwater Streams (1-20 mi²)	Wadeable Streams (20-300 mi2)	Large Rivers (>200-300 mi²)	Great Rivers (>6000 mi²)
Class 1	EWH	EWH	EWH	Shoreline Habitat Types (A,B,C)
Class 2	WWH	WWH	WWH	
Class 2 Modified	MWH	MWH	MWH	Modified Habitat
Class 3	2 Types: -Channel mod. --Non acidic MD	2 Types: -Channel mod. --Non acidic MD	3 Types: -Impounded -Channel mod. --Non acidic MD	
	USH	USH		
	LRW	LRW	LRW	
	2 Types: -Drainage maint. -AMD	2 Types: -Drainage maint. -AMD	1 Type: -Other (case specific)	

- Adopted in WQS
- Assessment Tool
- Under Study
- ORSANCO

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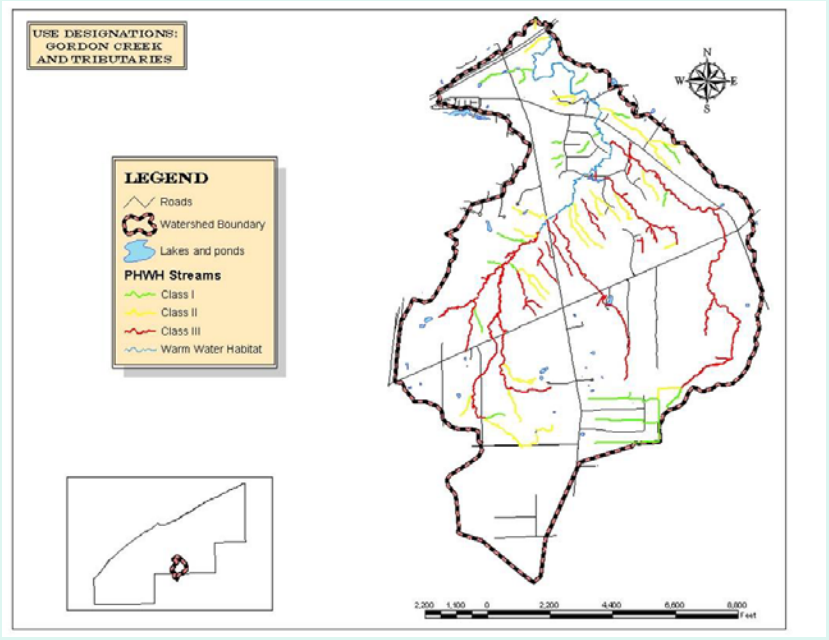
Lake County SWCD Application of the Ohio EPA Primary Headwater Methods



Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in Rapanos v. United States & Carabell v. United States

- Summary of Key Points

- **A. The agencies (US EPA and Army Corps of Engineers) will assert jurisdiction over the following waters:**

- **Traditional navigable waters**

- **Non-navigable tributaries of traditional navigable waters that are relatively permanent (ALL CLASS III PHWH, some CLASS II)**

- **Where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months) (some CLASS II PHWH)**

From: US EPA web link:
http://www.epa.gov/owow/wetlands/guidance/CWAwaters.html

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- **Summary of Key Points**

- **B. The agencies will decide jurisdiction over the following waters based on a fact-specific analysis to determine whether they have a significant nexus with a traditional navigable water:**

- **Non-navigable tributaries that are not relatively permanent (some CLASS II and all CLASS I)**

- **Summary of Key Points**

- **C. The agencies generally will not assert jurisdiction over the following features:**

- **Swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent, or short duration flow) (all CLASS I PHWH)**

- **Ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water**
- **(some CLASS II PHWH and all CLASS I)**

From: US EPA web link:
http://www.epa.gov/owow/wetlands/guidance/CWAwaters.html

Future Direction for Ohio EPA Concerning Primary Headwater Streams

- Network with county SWCD for adoption in land use plans and zoning ordnances.
- Training for environmental consultants (and others) that conduct Army Corps Section 404/401surveys.
- General education about importance of primary headwater streams. OEPA web page: http://www.epa.state.oh.us/dsw/wqs/headwaters/index.
- Potential adoption of Class I,II,III-PHWH concept into Ohio surface water regulations. New aquatic life designated uses (after public review from regulated community, environmental groups, local governments, etc.)

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Now On Ohio EPA Web Page

- Four fact sheets
- Technical report documents:
  - PHWH Assessment Manual with rapid headwater habitat evaluation protocol (HHEI)
  - Fish and Amphibian report
  - Macroinvertebrate report
  - Data compendium
  - www.epa.state.oh.us/dsw/wqs/headwaters/index.html

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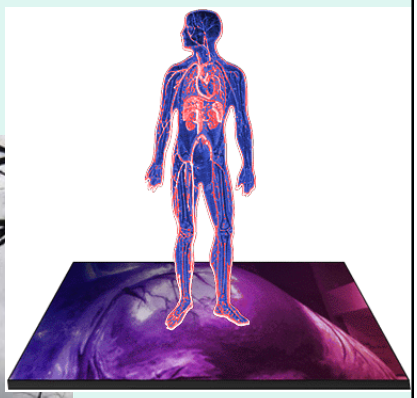
Small structures often have large effects that are disproportionate to their size—Primary Headwater Streams fit well this view of nature



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